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# Large round bale hay wastage by various feeding methods


## Abstract

The amounts of wheat or hybrid sudan hay wasted with three large round bale feeding methods were evaluated at two ranch locations. The feeding methods were: 1) bale processor (Hay Forage Industries BP 25®) used to shred forage into bunks; 2) the same processor used to shred forage onto the ground; and 3) unrolling large round bales on the ground. Estimated forage wastages or refusals from unrolling, shredding onto ground, and shredding into bunks were 23, 13, and 8% with wheat hay and 22, 16, and 11% with sudan hay, respectively. These results demonstrate the potential for substantial savings of forage. Shredding or tub-grinding large round bales and feeding in bunks appears to have economic potential when hay prices are high and when herd size is large.



## Keywords

Cattlemen's Day, 1993; Kansas Agricultural Experiment Station contribution; no. 93-318-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 678; Beef; Feeding management; Feed wastage; Large round bales





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# LARGE ROUND BALE HAY WASTAGE BY VARIOUS FEEDING METHODS[1,2]

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## Summary

The amounts of wheat or hybrid sudan hay wasted with three large round bale feeding methods were evaluated at two ranch locations. The feeding methods were: 1) bale processor (Hay Forage Industries BP 25®) used to shred forage into bunks; 2) the same processor used to shred forage onto the ground; and 3) unrolling large round bales on the ground. Estimated forage wastages or refusals from unrolling, shredding onto ground, and shredding into bunks were 23, 13, and 8% with wheat hay and 22, 16, and 11% with sudan hay, respectively. These results demonstrate the potential for substantial savings of forage. Shredding or tub-grinding large round bales and feeding in bunks appears to have economic potential when hay prices are high and when herd size is large.

(Key Words: Feeding Management, Feed Wastage, Large Round Bales.)

## Introduction

Wastage is expected in any hay feeding system, with the amount of loss varying with the particular hay package and feeding system used. Factors that contribute to wastage include forage trampling, leaf shatter, chemical and physical deterioration, and manure contamination. Because few appropriate estimates exist, our objective was to document hay wastage and refusal with three different feeding methods and determine the potential savings.

## Experimental Procedures

Large round bales (12 per location) of wheat or hybrid sudan hay were identified and weighed prior to feeding at two producer locations in Kansas. Cows were uniformly allotted to three groups and fed 1) hay shredded (BP 25® Bale Processor) into bunks, 2) hay processed as in treatment 1, but placed on the ground, and 3) large, round hay bales unrolled on the ground. Cattle numbers were adjusted across treatments to provide similar hay allowances among treatments. Twenty-

[1]Appreciation is expressed to Hay Forage Industries, Hesston, KS for use of a BP 25 Large Round Bale Processor.

[2]Appreciation is expressed to Jack Janssen, Geneseo, KS and to Jim Colborn, Medicine Lodge, KS for providing cattle, equipment, and assistance.

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four hours after each feeding, all remaining forage around bunks was manually gathered and weighed. For the other two treatments (hay shredded or unrolled on the ground), the length of the forage row was measured. Then, wasted hay in three or four 5-yard-long segments was gathered and weighed to calculate an estimate of wastage from the entire bale. Wastage estimates for all treatments were repeated daily for 4 days at each location. The dry matter content of gathered subsamples was determined to correct for moisture variation across treatments and day of sampling.

## Results and Discussion

There was considerable daily variation in forage wastage within feeding methods for both forage types (Table 1). Wheat hay shredded into bunks resulted in less forage waste than unrolling large round bales ($P < .10$). Simply unrolling large round bales resulted in 22 to 23% feeding wastage with the two forages. In contrast, shredding bales onto the ground or into feed bunks reduced wastage to 13 and 8% with wheat hay and to 16 and 11% with hybrid sudan, respectively.

Does the feed saved more than pay for the additional costs of shredding and feeding in bunks? An economic evaluation of the machine and bunk costs was compared with the value of hay saved through bunk feeding. Bunk space requirements were estimated at 1 foot per cow and at a cost of $2.00 per foot, annualized over 5 years at 10% interest. Machine ownership costs for the BP 25 hay processor used in this study were estimated using the format illustrated in Figure 1. Under the assumptions used in the figure, the hay processor would cost about $17 per hour when used 150 hours yearly, or about $6 per ton of hay processed. By comparison, custom rates for rental of a tub grinder reported in *Kansas Custom Rates 1991* averaged $57.72 per hour based on 48 reports. Common grinding charges run $6 to 10 per ton; however, most custom operators charge by the hour.

A partial budget used to evaluate the economics of processing hay and feeding is shown in Figure 2. The results of nine such analyses evaluating three hay types and three herd sizes are shown in Table 2. The potential savings of bunk feeding processed forage depends on hay price, expected reduction in hay wastage, and herd size.

Grinding hay and feeding in bunks have an economic payoff when feed values are higher and when herd size is larger. Calculated net savings were positive for grinding and bunk feeding wheat hay to a 300-head cow herd and for higher priced emergency hay during forage shortages for herds over 200 head.

**Table 1. Large Round Bale Forage Wastage by Feeding Method and Hay Type**

| | Feeding method[a] | | | |
|---|---|---|---|---|
| Forage type | Proc/bunk | Proc/ground | Unrolled | LSD[b] |
| Wheat hay: | | | | |
| % refused or wasted | | | | |
| Average | 8[b] | 13[bc] | 23[c] | 9.5 |
| Range | 3 - 12 | 5 - 20 | 10 - 32 | |
| Lb forage DM offered/cow | 22.3 | 21.2 | 24.6 | |
| Hybrid sudan hay: | | | | |
| % refused or wasted | | | | |
| Average | 11 | 16 | 22 | 11.0 |
| Range | 7 - 15 | 7 - 31 | 10 - 31 | |
| Lb forage DM offered/cow | 20.1 | 20.8 | 19.9 | |

[a]Proc/bunk and Proc/ground = forage fed with large round bale processor in bunk and on ground, respectively; Unrolled = forage bale unrolled on the ground.
[b]LSD = least significant difference.
[c,d]Means in the same row with unlike letters differ ($P < .10$).

**Table 2. Net Savings from Processing Hay and Feeding in Bunks—Three Hay Types and Three Herd Sizes**

| Hay type (value) | Herd size | | |
|---|---|---|---|
| | 100 Head | 200 Head | 300 Head |
| Sudan hay[a] ($45/ton) | –$1,493.17 | –$994.34 | –$633.52 |
| Wheat hay[b] ($50/ton) | –$1,126.76 | –$261.51 | $465.72 |
| Emergency hay[b] ($75/ton) | –$597.26 | $797.49 | $2,054.22 |

[a]11% feed waste reduction.
[b]15% feed waste reduction.

**Figure 1**

**Annual Machine Cost for**

*Bale Processor*

| | |
|---|---|
| Purchase cost of model tested | *$12,241.00* |
| This machine will last *10* years and is used *150* hours per year. | |
| Annual depreciation (20% salvage value) | *$ 979.28* |
| Annual interest on investment (6%) | *$ 734.46* |
| Fuel use | *$ --* |
| Estimated repairs (initial cost × hours use × repair factor) | *$ 840.00* |
| TOTAL ANNUAL COST | *$ 2,553.74* |
| Total cost per hour for *150* hours per year | *$ 17.02* |

NOTES: Comparative custom rates: avg. rental of tub grinder = $57.72/h based on 48 reports in *Kansas Custom Rates 1991*.

**Figure 2**

**Partial Budget Worksheet**

Alternative under consideration: *Grinding and feeding in bunks for 300-head cow herd—wheat hay @ $50/ton.*

| | |
|---|---|
| Added Returns: | |
| | |
| | |
| | |
| Reduced Costs: | |
| *Less feed costs: savings are* | *$3,177.00* |
| 15% × 423.6 tons × $50/ton | |
| | |
| (1) Total Added Returns and Reduced Costs | *$3,177.00* |
| Added Costs: | |
| *Annual costs for feed bunks* | *$ 158.28* |
| *(300 × $2/ft) = $600;* | |
| *5 yr@10%; hay processor(150 h)* | *$2,553.00* |
| Reduced Returns: | |
| | |
| | |
| | |
| (2) Total Added Costs and Reduced Returns | *$2,711.28* |
| Net Income Change [(1)–(2)] | *$ 465.72* |

NOTES: Assumed hay fed for 120 d. Trial used 23.53 lb hay on an as-fed basis. Total feed used was estimated to be 300 cows × 23.53 lb/d × 120 d = 423.6 tons of feed.